INVESTIGATOR'S ANNUAL REPORT

National Park Service

All or some of the information provided may be available to the public

Reporting Year: 1998	**Park:** Shenandoah NP
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Permit#:
SHEN1998N-211

Park-assigned Study Id. #:
unknown

Project Title:
Censusing And Modeling A Population Of Eastern Hemlock (Tsuga canadensis) Using Remote Sensing (N-211)

Permit Start Date: Jan 01, 1999	**Permit Expiration Date** Jan 01, 1999
Study Start Date: Jan 01, 1997	**Study End Date** Jan 01, 1999

Study Status:
Completed

Activity Type:
Research

Subject/Discipline:
Ecology (Aquatic, Marine, Terrestrial)

Objectives:
1. Distinguish hemlock trees from large scale, remotely sensed imagery based on the spectral reflectance properties of their canopy.
;2. Delineate and measure individual hemlock canopies from remotely sensed imagery using spatial pattern analysis methods. ;3. Using size/health - dependent recruitment, growth, and death rates as interpreted from the remotely sensed data, construct matrix population models for hemlock. Evaluate the effect of spatial and temporal variation on hemlock dynamics and identify critical life-history stages which have the greatest impact on population growth rate.;4. Compare and evaluate the accuracy and efficiency of air-based censising efforts with more traditional ground - based censusing.

Findings and Status:
Aerial, large scale, color photographs of the research site (collected in the Spring of 1997) were scanned into a digital environment. The hemlock component within this high resolution (12.7 cm/pixel) imagery was spectrally separated from the other ground covers using a maximum likelihood classification algorithm. Individual hemlock crown were separated using a two part process: 1) From the classified, binary image (hemlock=1) a smoothed Euclidean Distance Map (EDM) was developed.   2) A watershed segmentation procedure was then applied to the EDM. Results of the automated crown separation procedure were compared to manually delineated results using careful photo interpretation and field verification. Almost 85% of the dominant hemlock crowns identified manually were also correctly identified using the automated procedure. ;Aerial images of the study site were also collected in the spring of 1998. On-going research involves utilizing the 1997 and 1998 imagery to follow the fates of individual crown and investigate the influences on hemlock population dynamics.

For this study, were one or more specimens collected and removed from the park but not destroyed during analyses?
No

Funding provided this reporting year by NPS: 0	**Funding provided this reporting year by other sources:** 15

Fill out the following ONLY IF the National Park Service supported this project in this reporting year by providing money to a university or college

Full name of college or university:	Annual funding provided by NPS to university or college this reporting year:
West Virginia University	0